MILK PRODUCTION IN ALASKA

A report to the

ALASKA DIVISION OF AGRICULTURE

(Concerning Economic Issues
Associated with Milk
Production in Alaska)

by

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Figure 1. These data clearly show that the number of growing degree days are lower for the two locations in Alaska than they are for any of the other locations selected in the intermountain region of the United States. This suggests that cool season crops would likely be the only crops that could be successfully grown in these areas in Alaska. It should also be noted that the number of GDD during the late summer (August and September) are likely to limit the ability of grains to mature. This is also related to the increase in rainfall in the late summer that occurs in Alaska relative to the other areas. These two factors would likely limit grain production and the ability of farmers to harvest grain and some types of forage. It is, therefore, not surprising that hay is grown on more acres, by several orders of magnitude, than any other crop (the acres of other crops, such as potatoes, is generally less than the acres of grain) that is grown in Alaska as shown in Figure 2. These factors would favor grass production and be very conducive to animal production, especially those based on grazing. The combination of the above weather-related variables suggest that the "Alaska Factor" is real, but it primarily affects the production of crops and not

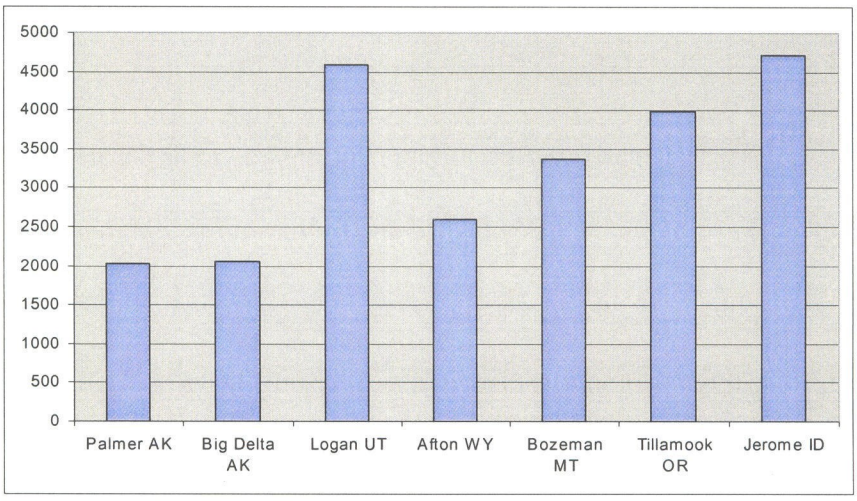

Figure 1. Historic growing degree days (GDD) for seven locations.

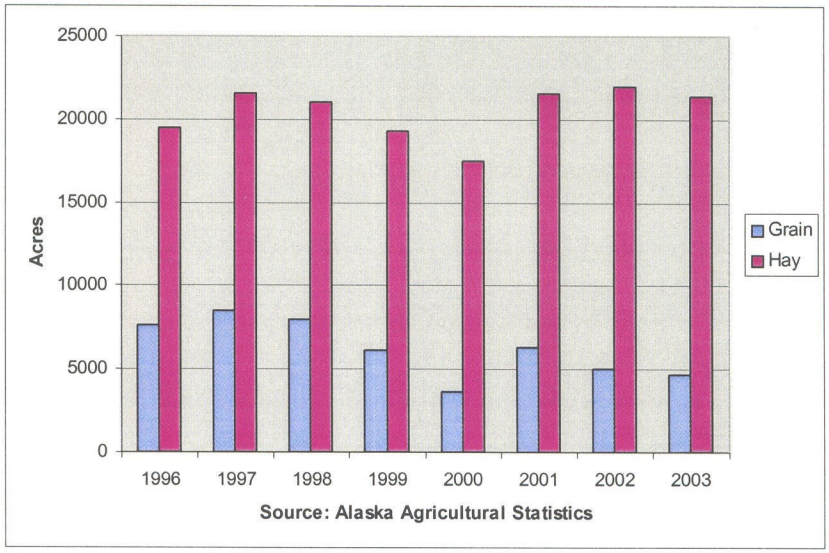

Figure 2. Acres of grain and hay harvested in Alaska, 1996-2003.

livestock production in the Matanuska Valley/Point McKenzie area. The cold temperatures during the winter in the Delta Junction area would require very different production practices for animal production there when compared to those near Anchorage or any of the other areas noted above (e.g., Cache Valley, Utah, or Fargo, North Dakota). The aforementioned does not include all of the factors that may affect or limit milk production in Alaska. For example, data concerning the impact of wind (wind chill in the winter or cooling in the summer) and solar radiation were not readily available. These could also affect animal and plant production, but it is not likely that these effects would have a major impact on animal production in the Matanuska Valley or Delta Junction areas. All of this simply suggests that weather-related variables will likely not limit milk production in the area near Anchorage, but it does indicate that the production of feed will be more difficult here than in any of the other areas selected for

comparison. This also suggests that the purchase of feed from areas outside of Alaska will likely affect the profitability of dairy operations in the state.

FACTORS AFFECTING DAIRIES IN ALASKA

Milk Production

One of the key variables that affects the profitability of any dairy operation is the productivity of the cows that are milked. The most common measure of productivity is pounds of milk produced per cow. Data from the Agricultural Statistics Service show that the production per cow is lower in Alaska[2] than most dairy production regions in the "lower 48" (Figure 3). Washington has had the distinction of having the highest production per cow among the United States for several years. Of the states shown, only Wyoming has production levels that are comparable to Alaska. It also should be noted that production per cow has risen over time in most states with Alaska being an exception to this trend. It is not known why milk cow productivity has not increased in Alaska, but the stable trend would suggest that milk production in Alaska is at a comparative disadvantage to other states from a strictly production point of view. It also should be noted that the limited experience (number of years they have been producing milk in Alaska and/or elsewhere) of some producers (see Appendix A) may also have an impact on the productivity of milk production in Alaska.

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[2]Data published in *Alaska Agricultural Statistics* indicate that the level of production (production per cow) was generally less than that reported in the surveys received.

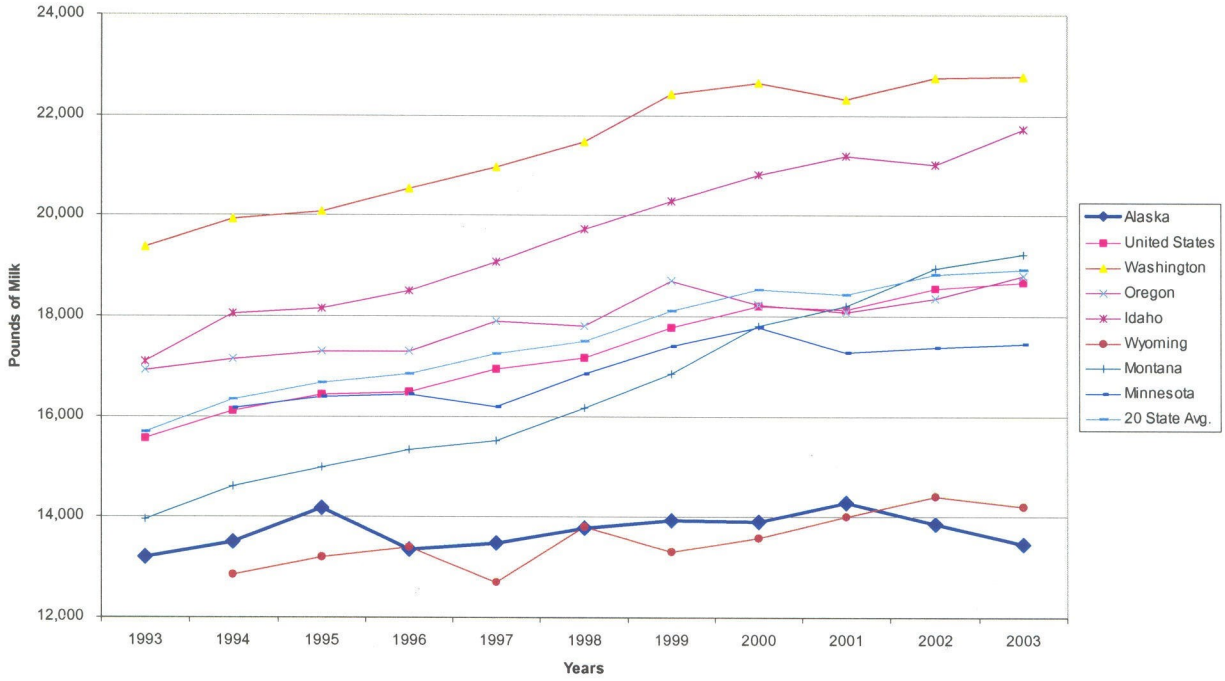

Figure 1. Annual milk production per cow for selected states, United States and 20 highest producing states.

Milk Prices

One of the most common complaints expressed in the surveys received from Alaska dairymen was that the price paid for milk in Alaska had not "changed in 20 years." Some indication of the difference in milk prices paid in Alaska compared to other areas of the United States are shown in Figures 4 and 5. These data clearly show that milk prices in Alaska have been significantly higher and more stable than prices in the "lower 48." As a result, the price risk faced by Alaska dairymen is less.

The data above do not address the issue the relative prices over time. In an effort to address this issue the cost of shipping milk from Washington to Alaska was derived. Conversations with personnel at the Mat Maid plant indicated that the cost of shipping milk from

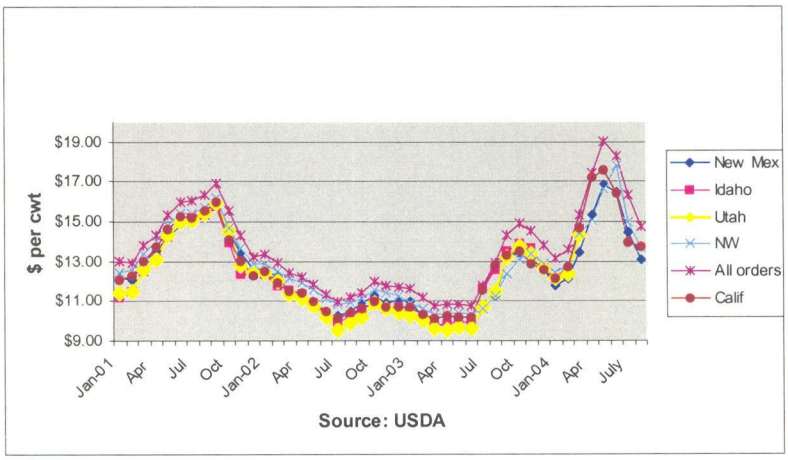

Figure 4. Mailbox prices for milk in selected states and federal marketing orders, January 2001 to July 2004.

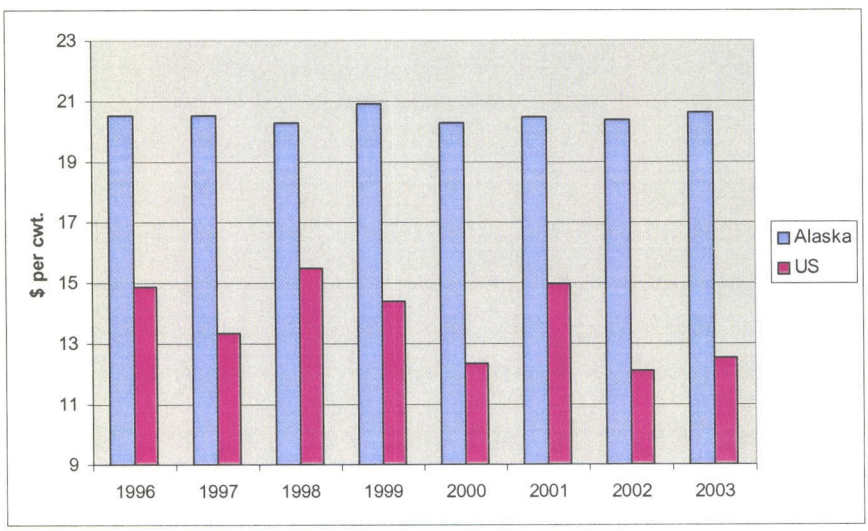

Figure 5. Milk prices in Alaska compared to the rest of the United States, 1996-2003.

Washington that is purchased to supplement the amount produced in Alaska was about $6.50 per hundred. The amount ($6.50 per cwt) was added to the mailbox price and the class I price for milk in the PNW order. The results are shown in Figure 6. These data indicate that the price paid

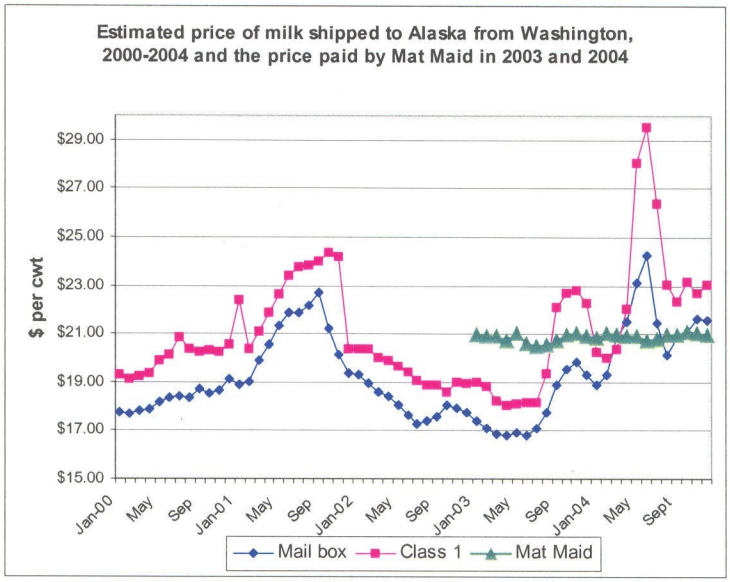

Figure 6. Estimated price of milk shipped from Washington to Alaska.

to Alaskan producers who sold milk to Mat Maid was higher during most of 2003 than what was paid for milk shipped from Washington. However, during most of 2004, the prices have been lower. During 2003 and 2004 the average price paid to producers selling to Mat Maid was $20.86. This compares to the average price of $19.52 for milk priced at the mailbox price (average net farm price) received by producers in the PNW. This represents a premium of more than $1.30 per cwt compared to PNW producers if milk delivered to Alaska was based on the price received by PNW producers. The price for class I (fluid consumption only) based milk shipped to Alaska averaged $21.60 during 2003-2004, or a discount of more than $0.70 per cwt compared to the prices paid to Alaskan producers. These data indicate that the prices that Alaska producers who sell to Mat Maid have been stable compared to producers in the PNW and have

likely been higher than the cost of obtaining milk from firms in Washington.[3] Milk prices represent the primary revenue factor affecting the profitability of dairy operations in Alaska, but another major factor is the cost of producing milk.

Production Costs

The dairymen in Alaska were asked to provide data on the costs and returns of their dairy operations. Two things became very evident when the data were received from the producers and the two primary lenders in Alaska (Farm Service Agency and the State of Alaska). First, as expected, the variation in costs and returns between operators was large. The second factor that became very evident was that these producers had rarely evaluated or considered the profitability of parts of the farm business (the farm business is evaluated as a set of enterprises such as milk production, raising heifers, hay production, etc.). As a result, there was limited understanding of which enterprises were contributing to the firm's "bottom line." In addition, the enterprises varied by farm operation. For example, some dairies produced essentially all of their hay, some sold homegrown hay, and some purchased most of the hay used by their dairy cows. In addition, one operation had a milk processing facility. As a result, it was necessary to at least separate, to the degree possible, the costs and returns of the milk production enterprise for each farm so the firms could be compared. This required that the following procedures be used.

1. The prices paid for specifically identified inputs for milk production (including feed) were assumed to be the same for all producers. As a result, differences in quality or location were ignored. As a result, the price of milk and purchased feedstuffs for

[3]Data on the prices paid by Mat Maid for milk from the PNW over time were not obtained but are probably available. This comparison would be needed if marketing issues were to be addressed.

producers in the Delta Junction area were assumed to be the same as producers in the Point McKenzie-Palmer area. There are differences between these two areas, but the cost and return tables that follow maintain the confidentiality of information provided by individual operators.

2. Inputs that were produced on the farm were valued at market prices. Therefore, feed that was produced was valued at the same price as purchased feed and do not reflect the cost of production. As a result, profits or losses associated with growing farm produced feed are not considered. If a complete analysis of the total farm operation for these operators was conducted, the cost and returns of each of the various enterprises would be estimated. This would provide information concerning what area(s) of the total farm were contributing to the firms "bottom line."

3. The costs of nonspecified costs were the amounts reported in the surveys provided by the producers. Some of the costs reported (e.g., fertilizer) were clearly not related to the dairy enterprise and some costs (e.g., vet/medicine) were only attributable to animal enterprises. Some costs (e.g., supplies) may be allocated to a number of enterprises. In these cases some judgment was required concerning what percentage or amount was allocated to the dairy enterprise. Producers were asked to refine the allocations that were included in the draft budget that was discussed in my visit with these operators in January 2005. None of this information has been provided to date. As a result, there may be some error in the estimates for costs, such as hired labor, depreciation and repairs, utilities, and interest that could be allocated to more than one enterprise or part of the firm. However, the error is likely to be less than the amount of variation that exists between operators.

4. When the rations used by most of the dairymen in Alaska were not provided, an alternative approach was used. Data were obtained from Alaska Mill and Feed concerning the cost of alternative feeds.[4] These data were used to derive "least cost" rations for the various levels of production used in this study. Data were also used for the dairy owners who did provide ration data for their operations.

Table 6 shows the costs and returns for a representative dairy enterprise in Alaska. Similar budgets are also found in Appendix B for different assumed levels of production. These budgets do not reflect the costs or returns of any Alaska dairy operation in the state, so confidentiality of individual operations was maintained. Also, it should be remembered that there is a significant variation among the data provided by the operators surveyed. But the following discussion outlines some of the primary factors that affect the net returns earned by Alaskan dairy operators.

Input Access and Prices

The price of essentially every input is higher in Alaska than it is in the "lower 48." This difference is particularly pronounced for feed. For example, barley prices are about double the prices that exist in Washington or in Utah.

Access to some services (veterinarian services, nutritionists, and hoof trimmers) is very limited or nonexistent. As a result, the skill of producers in Alaska likely would have a larger impact on net returns than they would in areas where these services are readily available at a

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[4]A delivery charge of $15 per ton and a processing cost of $7 per ton was added to the concentrate costs. Hay costs were taken from *Alaska Agricultural Statistics* for 2003.

Table 6. Costs and returns for a representative dairy in Alaska with 15,000 lbs. of production per cow.

Receipts	Unit(s)	Price or Cost/ unit	Number of Units/cow	Value or Cost per cow	Value per cwt	Total Value
Milk Sales	Cwt	$20.95	15,000	$3,142.50	$20.95	$314,250
Sale of calves						
Bulls	Head	$0.00	0.44	$0.00	$0.00	$0
Heifers	Head	$100.00	0.44	$44.00	$0.29	$4,400
Sale of cull cows	Head	$600.00	0.20	$120.00	$0.80	$12,000
Other (manure ,etc)	Head	$0.00	1.00	$0.00	$0.00	$0
Subtotal				$3,306.50	$22.04	$330,650
Expenses						
Operating						
Feed				$1,902.04	$12.68	$190,204
Grass hay	Ton	$225.00	4.22	$949.50	$6.33	$94,950
Pasture	AUMs	$15.00	0.00	$0.00	$0.00	$0
Silage/haylage	Ton	$75.00	0.00	$0.00	$0.00	$0
Barley	Ton	$165.00	1.82	$300.30	$2.00	$30,030
Concentrates	Ton	$263.00	2.48	$652.24	$4.35	$65,224
Trucking	Head	$0.00	1.00	$0.00	$0.00	$0
Bedding	Head	$25.00	1.00	$25.00	$0.17	$2,500
Supplies	Head	$60.00	1.00	$60.00	$0.40	$6,000
DHIA	Head	$0.00	1.00	$0.00	$0.00	$0
Utilities	Head	$125.00	1.00	$125.00	$0.83	$12,500
Vet & Medicine	Head	$50.00	1.00	$50.00	$0.33	$5,000
Custom/trim	Head	$10.00	1.00	$10.00	$0.07	$1,000
Breeding	Head	$18.00	1.60	$28.80	$0.19	$2,880
Operating interest	Head	$10.00	1.00	$10.00	$0.07	$1,000
Replacements	Head	$1,500.00	0.25	$375.00	$2.50	$37,500
Subtotal				$2,585.84	$17.24	$258,584
Allocated						
Repairs & maintenance						
Barn & facilities	Head	$42.00	1.00	$42.00	$0.28	$4,200
Equipment	Head	$25.00	1.00	$25.00	$0.17	$2,500
Depreciation						
Barn & facilities	Head	$1.00	1.00	$1.00	$0.01	$100
Equipment	Head	$2.00	1.00	$2.00	$0.01	$200
Interest						
Barn & facilities	Head	$20.00	1.00	$20.00	$0.13	$2,000
Livestock	Head	$12.00	1.00	$12.00	$0.08	$1,200
Fuel & oil	Head	$35.00	1.00	$35.00	$0.23	$3,500
Insurance	Head	$12.00	1.00	$12.00	$0.08	$1,200
Hired labor	Head	$250.00	1.00	$250.00	$1.67	$25,000
Misc.	Head	$13.00	1.00	$13.00	$0.09	$1,300
Property taxes	Head	$1.00	1.00	$1.00	$0.01	$100
Subtotal				$413.00	$2.75	$41,300
Total costs				$2,998.84	$19.99	$299,884
Net returns						
Above feed costs				$1,404.46	$9.36	$140,446
Above operating				$720.66	$4.80	$72,066
Above total costs (amount for family living and debt payments)				$307.66	$2.05	$30,766

Assumptions	
Average number of cows in herd	100
Average production per cow	15,000
Death loss	
Calves	5.00%
Cows	5.00%
Turnover rate	25.00%

All calves sold (may be to another enterprise such as heifer raising)
Number of cows in herd is stable

reasonable cost. As a result, the skill and experience of each producer probably has a larger influence on costs than it would in areas where these services are readily available.

It also should be noted that essentially all of the heifers that entered the herds in 2003 and 2004 were raised animals. As a result, most Alaskan producers have lower rates of turnover (cow culling rates) that are lower than they are in the "lower 48." This has both benefits and costs. A younger distribution of cows in the herd generally results in higher levels of production, but it also results in higher replacement costs. Data obtained from the survey suggest that there are enough heifers being raised to sustain the industry, but rapid expansion is not likely. This would require the importation of heifers from Canada or the "lower 48." This will probably not occur in the near future because restrictions on the acquisition of heifers from Canada will probably not change in the foreseeable future because replacement heifers would not be destined for slaughter. In addition, the relatively tight supply of dairy heifers in the United States has resulted in near record-setting prices. For example, springer prices have been near $2,000 in western markets for the last few months, which is $500 more than the costs shown in Table 6. If heifers were imported from the United States, transportation costs would have to be added to these prices. This could result in prices paid for heifers that were essentially double those shown in Table 6. This high price could not be sustained in the long run. As a result, replacement heifers in Alaska will likely continue to be farm-raised.

Sale of Cull Animals and Calves

The revenue received from the sale of bull calves is generally zero, because there is not a market for these animals. One producer referred to them as "bear bait." As a result, a relatively

important source of income for producers in the "lower 48" is not available to producers in Alaska. The market for the sale of cull cows is also limited. These animals can be sold to existing slaughtering facilities, but the time that they can/will be accepted may be limited, and there is limited market competition for these sales.

Allocated Costs

To the author's knowledge, none of the operations are "drylot dairies," because they all also operate farms in conjunction with the dairy. As a result, some costs (interest, depreciation of tractors, etc.) will be jointly shared with several enterprises. These costs have to be allocated in some manner. This is never an easy issue to resolve and involves some judgement. Operations, such as the dairies surveyed, commonly do not allocate these costs because they are viewed as part of the total operation. In some of the surveyed operations, the dairy is the only source of farm income. In these cases, income from the dairy operation must pay these costs. However, in many cases these costs would be incurred if no cows were being milked (e.g., interest on land, depreciation on machinery that is not used for dairy operations, etc.). These costs should not be allocated to the dairy enterprise and should be included as part of the cost of other enterprises. Some costs (e.g., depreciation or interest on a tractor that is used both in the dairy and in the farming operations) need to be shared.

The allocated costs vary widely amongst dairy producers in general, but the variation is very wide amongst the producers in Alaska. One of the reasons for this stems from the fact that some producers have relatively new or recently renovated facilities, while others have facilities that are old and have been completely depreciated. The older dairies would be expected to have

higher than average repair and maintenance costs, but some of these repairs can be deferred in the short run. The older operations will likely need to make relatively major renovations and/or incur high repair/maintenance costs in the near future. There is, therefore, a major tradeoff between high repair and maintenance costs for the older facilities and high depreciation costs for those having newer facilities. This also affects the amount of labor that was hired because newer facilities are generally less labor-intensive. In some cases family members provide essentially all of the labor, while in other cases labor was hired to supplement family members.

Production per Cow

The net returns would increase dramatically if production was increased (budgets for other levels of production are shown in Appendix B). For example, a production level of 21,000 lbs. per cow (this is about 1.5 times the production level reported for producers in *Alaska Agricultural Statistics* in 2003) would result in net returns to the operator for family living and debt payment of about $120,000. This can be compared to an estimated loss of over $30,000 if production was 12,000 lbs. per cow (which is slightly less than the average production reported in *Alaska Agricultural Statistics* for 2003). This comparison clearly shows that the level of a production has a major influence of net returns, but it also indicates that dairy production can be profitable in Alaska.

Feed Costs[5]

The role of production was emphasized above, but differences in costs may be just as important. The largest cost in the representative budget is for feed (about 60% of the total cost). This percentage is slightly higher than it is for dairies in the "lower 48" (it is commonly between 40% and 50%).

Feed costs represent an area where some Alaska dairy operators may have the greatest opportunity to reduce their cost of producing milk. For example, data were obtained from Alaska Mill and Feed for the most common concentrated rations used by dairy operators in the Point McKenzie area. One of the dairy operators in the Delta Junction area also provided information on the rations they fed their cows. The concentrate formulations resulted in a difference of nearly $12,000 per year (high versus low cost concentrate formulation) for the rations used in the Matanuska Valley area.

One other comparison was also interesting. The cost of the concentrate portion of the ration alone for some of the dairies was more than the cost of the total ration, which included hay and silage, used by one of the dairy operators for essentially the same level of production. This suggests that efforts to balance and feed "least-cost" rations could save some producers a significant amount of money and could increase net returns. It should also be noted that the least-cost rations that were run indicated that high protein alfalfa cubes were nearly as cost-effective as the hay that was purchased in Alaska.

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[5]Some dairy operations in Alaska graze (pasture) animals during some portion of the year. Data were requested from these dairies concerning the period of time cows grazed pasturelands and what other feeds were fed during the grazing period. These data were not received from these dairymen. Presumably, this would reduce the cost of feed for these operations. However, it is not clear that pasture is a profitable crop enterprise in Alaska because data on this enterprise are not available.

Interest and Debt

There is probably a no cost factor that is affecting differences in the "bottom line" for dairy producers in Alaska more than interest costs. The amount of debt carried by these operations varied from 0 to more than $13,000 per cow. At the highest level of debt being carried by the dairies surveyed, and at an interest rate of 5%, it would take over $65,000 in net returns just to pay the cost of interest without any funds being available for either family living or payment of principal on the debt. To service this level of debt, a dairy operator in Alaska needs to have a level of production that is higher than any of those reported. In addition, this same dairy would also have to have production costs, exclusive of debt payments, that were lower than any of the dairy operations surveyed. The chance of one producer having the highest level of production and the lowest production costs is not expected. This suggests that the high level of debt being carried by some of the dairy operations in Alaska is simply not sustainable in the long run.

Net Returns

The net returns for the operator for family living and debt payments as shown in the representative budget (Table 6), are not high—estimated to be $30,765 or $307 per cow. Those producers who are debt free have more net income (by nearly $4,500) than the representative dairy. If the family provides essentially all of the labor, there is about $25,000 available for family living and debt service. The net returns shown in the representative budget ($307 per cow) are similar to those that exist for a similar size dairy in the "lower 48" that was producing the same amount of milk. This suggests that firms that are less efficient (higher costs and/or lower

returns) likely would not survive in the long run unless funds from outside the firm or other profitable enterprises were used to augment the net returns earned by the dairy enterprise .

The March 25, 2005 issue of *Hoard's Dairyman* (p. W-61) contained an article entitled "Which areas have been most profitable the last five years?." This article outlined the net returns for the seven areas shown in Table 7. Two things become very evident when these returns are compared to those for the representative Alaska dairy operation. First, the returns in 2004 in Alaska are lower than they are for the other states/regions for 2004. Secondly, the average net returns over the period 2000-2004 are not as high and are all less than the estimated net returns for Alaska in 2004. This suggests that the returns being obtained by dairy operators in Alaska are probably comparable to those in other areas. The *Hoards's Dairyman* article did indicate, however, that the high-profit areas have dairies that have "two key similarities: large herds and high-producing cows." For example, the average herd size in Washington[6] was 288 head in 2003, which is nearly three times the most common size of dairy herds in Alaska , and the production per cow was 22,780 lbs., which almost doubles the production per cow in Alaska.

Returns Between Areas

The variation between the surveyed dairy operations is also pronounced when the operations in the north (Delta Junction area) are compared to those in the south (Point McKenzie-Palmer area). The facilities differ because cows must be inside during the winter in the north while those in the south require less shelter. The market area served and milk marketing practices used are also very different in the north compared to the south. In addition, the

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[6]The size of the operations included in the study was not specified but it is probably larger than the average for Washington.

Table 7. Net returns and average production per cow for seven areas

State or region	Net returns first 9 months of 2004	Average net returns 2000-2004	Production (lbs.) per cow in 2004
Arizona	$336	$57	22,788
California	495	241	21,139
High plains	264	67	19,611*
Idaho	394	132	21,466
New Mexico	405	233	20,583
Texas	393	178	18,837
Washington	527	251	22,852

Sources: *Hoard's Dairyman* (2005, p. W-61); USDA.
*Production data are just for Kansas.

availability and cost of feed are different—the cost of purchased feeds are higher in the north as a result of shipping while locally grown feeds are more abundant and less expensive. As a result, these two areas should generally be evaluated as different production areas. This was not done in this study because the limited number of operations in the north would have resulted in the disclosure of information for a particular operation(s), which would have violated the confidentiality of individual operations that was guaranteed when this study was started.

Conclusions

If it was not obvious before, one conclusion must be emphasized—every dairy operation in Alaska is different. As a result, changes, such as the price of milk, feed, or other variables, will affect each firm differently. Some firms can withstand changes that reduce profitability much easier than can other firms. Every firm would be positively affected by an increase in the price paid for milk or reductions in the cost of inputs. However, efforts to reduce the price of

purchased inputs or an increase in the price paid for milk at the farm level will be affected by forces beyond the control of firms in Alaska. For instance, the cost of inputs purchased from sources in Canada or the "lower 48" will be dictated by market forces outside of Alaska. As a result, the primary way dairy operators in Alaska, just like dairy operators in other states, can increase net returns is to efficiently use resources under their control. This means that evaluations of alternative actions must be given high priority. This would include possible actions, such as increasing milk production per cow, but it is likely that actions that would reduce the cost of milk production would have the greatest promise for some of the producers surveyed.

Marketing Considerations and the Long-Run Viability of the Alaska Dairy Industry

The vegetation in the Anchorage area was surprising this past summer, but a bigger surprise was the existence of "local brands" of milk/milk products on the shelves of major stores in Alaska. This rarely (never?) exists in the "lower 48." Should these stores decide not to stock these local products (Mat Maid and Northern Lights), it is doubtful that milk production could be maintained in Alaska.

One other factor that was not included in this study that could have a major impact on the long-run viability of dairy operations in Alaska is the influence of milk pricing at the retail level. Milk and sometimes other milk products are used by retail outlets as a "loss leader" to entice shoppers to come to a particular establishment. Based on conversations with Alaska dairy producers and processors, Alaska-produced milk apparently has a very positive image and is preferred by Alaskans, but this may not be sufficient to retain market share in the long run.

Efforts to raise the price paid for milk to producers in Alaska would result in an increase in the price of milk at the retail level. This would also result in a comparative advantage for "outside milk" if the price of outside milk did not also increase. This represents a major marketing issue that is beyond the scope of this study. Some states have established state marketing orders that provide a floor price for milk sold in their state. However, these efforts are generally strongly resisted by retail grocery chains. A state marketing order offers some hope for Alaska dairy operations if grocery chains in Alaska were to either require the payment of fees for "shelf space" or if they priced store-brand milk (and products) at prices that were lower than the cost of producing milk (all farm to retail costs[7]) in Alaska. Obviously, dairy producers in Alaska, as well as other areas, would prefer an increase in the price they were paid for milk they produce. But the cost of obtaining milk from alternative sources will limit the amount that can be paid to Alaskan producers. Only those producers who can produce the milk that is desired at a price that is dictated by the market will survive in the long run. This study has found that some of the producers in Alaska will likely survive while others will not unless: (a) market conditions improve, (b) milk production per cow increases, and/or (c) production costs decline.

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[7] Some producers believe that cost savings can be obtained by reducing the cost of processing milk at the Mat Maid plant. These potential cost savings could be passed on to dairy farmers. It is not known if cost savings exist for the Mat Maid or an alternative processing facility. The Northern Lights operation at Delta Junction is closely integrated with at least some of the producers who supply milk to this firm—one of the milk producers also owns the processing facility. It is likely that this firm will survive in the long run *if* competitive forces at the retail level allow a profit margin to exist in the long run.

References

Hoard's Dairyman (March 25, 2005): W-61.

USDA. *Alaska Agricultural Statistics.* Various years.

APPENDICES

Appendix A: Questionnaire Sent to Alaska Dairy Operators With a Synopsis of the Responses Received

Alaska Division of Agriculture
and
Utah State University

Alaska Dairy Industry Study

1. Name of producer: 9 Producers, 0 Mc declined, 0 Mc new = 7

2. Personal characteristics/information
   A. How long have you operated a dairy
      1. Total years 9-43 ave = 24 most from other areas
      2. Years in Alaska: 3-43 ave = 21
      3. Years at current location: 3-43 ave = 18

   B. How long do you expect to operate this dairy operation?
   about half 20 yrs or more. Others variable

   C. Are other members of your family interested in continuing this operation if you ceased operation (yes or no)? 50% If not, what would you expect would happen to this dairy if you ceased operation?

3. What factors, if any, do you believe will limit your dairy operation
   A. In the next year? Price of milk
   costs: feed, fuel, labor, land

   B. In the long run? cost of production
   very high debt for some (more than $10,000/cow)

4. Typical production/management practices in the last two years
   A. What is the primary breed(s) of cows you milk: mostly Holstein
   B. What percentage of your replacement heifers are:
      1. Raised from owned cows: almost totally
      2. Purchased from
         Other Alaska dairies: a few
         Canada: 3% purchased
         Other US states: ____
      3. Other (specify): ____
      100%

   C. Disposition of bull calves (percent that are)
      1. Sold as newborn calves: most common
      2. Retained and sold as steers: essentially none
      3. Other (specify) "Veal bait"
      100%

D. What percentage of the calves born are the offspring of AI bulls
   1. From Milk Cows: high %
   2. From Replacement heifers: high %

E. How many times are cows milked daily: 2X

F. What percentage of the milkings are done by:
   1. Owner/operator: ____
   2. Other family members: ____ } varies by operator
   3. Hired labor: > 50%
   100%

G. When were the following facilities/equipment constructed or installed?
   1. Milk barn? ave 1986
   2. Housing barn(s)? ave 1989
   3. Milking equipment? —

H. Please describe the type of milking facility you use (double 6 herringbone, two westfalia milking units, etc.): Varies

I. Size of bulk tank(s): ave = 1600 gallons

J. During which months are milk cows typically
   A. Confined in enclosed facilities: some total
   B. Confined in non enclosed facilities: summer
   C. Pastured: some
   D. Other (specify): ____

K. What is the capacity (number of stalls) of your confinement barn(s): total available > 1000

L. Briefly describe the method(s) used in raising replacement heifers:
   normal

M. What percentage of your cows are replaced each year due to
   1. Death ? ____ } total % < lower 48
   2. Culling? ____
   100%

N. What are the primary reasons for culling cows from your milk herd?

O. What is your usual calving interval for cows in your herd (number of months from birth of one calf to the next): ± 14 months

Data from this page needs to be refined -- more input needed

5. Indicate the following

	1 January 2003	1 January 2004	Current	
			Number	estimated $/head
Number of cows that are/were in their				
A. First lactation	generally older			500–2500 estimated
B. Second lactation				
C. Third (or greater) lactation				
Number of cows being milked				
Number of dry cows				
Number of bred replacement heifers				± 1300
Number of replacement heifers (not bred)				
Number of bulls		few		
Number of steers		essentially none		

6. How many (if any) breeding animals did you purchase in 2003 and 2004?

Type of animal	2003	2004	
		Number	Cost/head
Bulls		essentially none	
Milk cows			
Bred replacement heifers			
Other replacement heifers			

7. What percentage of the following feeds consumed by your dairy operation in 2004 were from the following sources:

	Home grown	Other Alaska Producers	Imported	
Grass hay	mostly			100%
Alfalfa hay	← None		→	100%
Oat hay	mostly			100%
Barley	split			100%
Corn grain	none			100%
Other Concentrates			all	100%
Other feeds (specify)				100%
Haylage	most common			100%
				100%
				100%
				100%

8. Do you use a total mixed ration (TMR) (yes or no): half
If you have a ration sheet(s), please attach it.

9. What crops were grown on your farm (if any) and were fed to your dairy animals? What is the estimated value per unit of these feeds if they were not fed to your animals in 2004?

			Amount produced	
Crop	Units (tons, Bu)	$ per unit	2003	2004
Grass hay				
Oat hay				
Other hay				
Barley				
Other (specify)				

This needs to be refined

10. Given the crops indicated above (question 9), what percentage was fed to the classes of animals noted below in 2004
Note: the percentages for a row needs to equal 100%? need to be refined

Percent typically fed to

Crop	Milk cows	Heifers	Other Livestock	Sold
Grass hay				
Oat hay				
Other hay				
Barley				
Other crops (specify)				

11. What method(s) do you use to keep/maintain financial records for your dairy operation (ledgers, Quicken, etc)? Quicken or QuickBook fairly common

12. Do you own a computer? all If so,
a. What operating system is used? _____
b. Do you have access to the internet? all
c. What is your e-mail address (if any)? _____
d. Do you keep production records for your dairy on the computer? generally
What kind(s)? various

13. If labor is hired to assist in your dairy operation, what wage rate is paid
a. Milking: $ 10-20 per hour (milking, hour or ??) – variable
b. Other labor: $ 10-12 per hour

14. How many people regularly work on your dairy operation?
a. Members of your family? _____ } variable
b. Hired labor? _____

15. What were your total expenditures for the following items (including estimated amount for November and December 2004) during 2003 and 2004? What percentage of these costs were for your dairy cows (exclude costs for farming and young stock)? You may want to use your 1040 F statement to assist you in determining the total values?

Item	2003		2004	
	Total $	% for milk cows	Total $	% for milk cows
Purchased grass hay				
Purchased other hay				
Purchased grain				
Purchased concentrates				
Purchased other feed				
Vitamins & minerals				
Dairy supplies				
Milk hauling & marketing				
Veterinary				
Medicines				
Utilities				
Fuel & Oil				
Insurance				
Hired labor				
Dues and Fees				
AI costs				
Building repairs				
Machinery repairs				
Interest on dairy facilities				
Interest on dairy animals				
Building/facility depreciation				
Machinery depreciation				
Custom hire (hoof trim, etc)				
Other (specify)				

Appendix B: Representative Alaska Dairy Budgets for Various Levels of Production per Cow

Alaska Dairy Budget for 2004

12000 pounds of milk per cow

Receipts	Unit(s)	Price or Cost/ unit	Number of Units/cow	Value or Cost per cow	Value per cwt	Total Value
Milk Sales	Cwt	$20.95	12,000	$2,514.00	$20.95	$251,400
Sale of calves						
Bulls	Head	$0.00	0.44	$0.00	$0.00	$0
Heifers	Head	$100.00	0.44	$44.00	$0.37	$4,400
Sale of cull cows	Head	$600.00	0.20	$120.00	$1.00	$12,000
Other (manure ,etc)	Head	$0.00	1.00	$0.00	$0.00	$0
Subtotal				$2,678.00	$22.32	$267,800
Expenses						
Operating						
Feed				$1,930.23	$16.09	$193,023
Grass hay	Ton	$225.00	3.93	$884.25	$7.37	$88,425
Pasture	AUMs	$15.00	0.00	$0.00	$0.00	$0
Silage/haylage	Ton	$75.00	0.00	$0.00	$0.00	$0
Barley	Ton	$165.00	1.82	$300.30	$2.50	$30,030
Concentrates	Ton	$239.00	3.12	$745.68	$6.21	$74,568
Trucking	Head	$0.00	1.00	$0.00	$0.00	$0
Bedding	Head	$25.00	1.00	$25.00	$0.21	$2,500
Supplies	Head	$60.00	1.00	$60.00	$0.50	$6,000
DHIA	Head	$0.00	1.00	$0.00	$0.00	$0
Utilities	Head	$125.00	1.00	$125.00	$1.04	$12,500
Vet & Medicine	Head	$50.00	1.00	$50.00	$0.42	$5,000
Custom/trim	Head	$10.00	1.00	$10.00	$0.08	$1,000
Breeding	Head	$18.00	1.60	$28.80	$0.24	$2,880
Operating interest	Head	$10.00	1.00	$10.00	$0.08	$1,000
Replacements	Head	$1,500.00	0.25	$375.00	$3.13	$37,500
Subtotal				$2,614.03	$21.78	$261,403
Allocated						
Repairs & maintenance						
Barn & facilities	Head	$42.00	1.00	$42.00	$0.35	$4,200
Equipment	Head	$25.00	1.00	$25.00	$0.21	$2,500
Depreciation						
Barn & facilities	Head	$1.00	1.00	$1.00	$0.01	$100
Equipment	Head	$2.00	1.00	$2.00	$0.02	$200
Interest						
Barn & facilities	Head	$20.00	1.00	$20.00	$0.17	$2,000
Livestock	Head	$12.00	1.00	$12.00	$0.10	$1,200
Fuel & oil	Head	$35.00	1.00	$35.00	$0.29	$3,500
Insurance	Head	$12.00	1.00	$12.00	$0.10	$1,200
Hired labor	Head	$250.00	1.00	$250.00	$2.08	$25,000
Misc.	Head	$13.00	1.00	$13.00	$0.11	$1,300
Property taxes	Head	$1.00	1.00	$1.00	$0.01	$100
Subtotal				$413.00	$3.44	$41,300
Total costs				$3,027.03	$25.23	$302,703
Net returns						
Above feed costs				$747.77	$6.23	$74,777
Above operating				$63.97	$0.53	$6,397
Above total costs (amount for family living and debt payments)				($349.03)	($2.91)	($34,903)

Assumptions

Average number of cows in herd	100
Average production per cow	12,000
Death loss	
Calves	5.00%
Cows	5.00%
Turnover rate	25.00%

All calves sold (may be to another enterprise such as heifer raising)

Number of cows in herd is stable

Alaska Dairy Budget for 2004

15000 pounds of milk per cow

Receipts	Unit(s)	Price or Cost/ unit	Number of Units/cow	Value or Cost per cow	Value per cwt	Total Value
Milk Sales	Cwt	$20.95	15,000	$3,142.50	$20.95	$314,250
Sale of calves						
Bulls	Head	$0.00	0.44	$0.00	$0.00	$0
Heifers	Head	$100.00	0.44	$44.00	$0.29	$4,400
Sale of cull cows	Head	$600.00	0.20	$120.00	$0.80	$12,000
Other (manure ,etc)	Head	$0.00	1.00	$0.00	$0.00	$0
Subtotal				$3,306.50	$22.04	$330,650
Expenses						
Operating						
Feed				$1,902.04	$12.68	$190,204
Grass hay	Ton	$225.00	4.22	$949.50	$6.33	$94,950
Pasture	AUMs	$15.00	0.00	$0.00	$0.00	$0
Silage/haylage	Ton	$75.00	0.00	$0.00	$0.00	$0
Barley	Ton	$165.00	1.82	$300.30	$2.00	$30,030
Concentrates	Ton	$263.00	2.48	$652.24	$4.35	$65,224
Trucking	Head	$0.00	1.00	$0.00	$0.00	$0
Bedding	Head	$25.00	1.00	$25.00	$0.17	$2,500
Supplies	Head	$60.00	1.00	$60.00	$0.40	$6,000
DHIA	Head	$0.00	1.00	$0.00	$0.00	$0
Utilities	Head	$125.00	1.00	$125.00	$0.83	$12,500
Vet & Medicine	Head	$50.00	1.00	$50.00	$0.33	$5,000
Custom/trim	Head	$10.00	1.00	$10.00	$0.07	$1,000
Breeding	Head	$18.00	1.60	$28.80	$0.19	$2,880
Operating interest	Head	$10.00	1.00	$10.00	$0.07	$1,000
Replacements	Head	$1,500.00	0.25	$375.00	$2.50	$37,500
Subtotal				$2,585.84	$17.24	$258,584
Allocated						
Repairs & maintenance						
Barn & facilities	Head	$42.00	1.00	$42.00	$0.28	$4,200
Equipment	Head	$25.00	1.00	$25.00	$0.17	$2,500
Depreciation						
Barn & facilities	Head	$1.00	1.00	$1.00	$0.01	$100
Equipment	Head	$2.00	1.00	$2.00	$0.01	$200
Interest						
Barn & facilities	Head	$20.00	1.00	$20.00	$0.13	$2,000
Livestock	Head	$12.00	1.00	$12.00	$0.08	$1,200
Fuel & oil	Head	$35.00	1.00	$35.00	$0.23	$3,500
Insurance	Head	$12.00	1.00	$12.00	$0.08	$1,200
Hired labor	Head	$250.00	1.00	$250.00	$1.67	$25,000
Misc.	Head	$13.00	1.00	$13.00	$0.09	$1,300
Property taxes	Head	$1.00	1.00	$1.00	$0.01	$100
Subtotal				$413.00	$2.75	$41,300
Total costs				$2,998.84	$19.99	$299,884
Net returns						
Above feed costs				$1,404.46	$9.36	$140,446
Above operating				$720.66	$4.80	$72,066
Above total costs (amount for family living and debt payments)				$307.66	$2.05	$30,766

Assumptions

Average number of cows in herd	100
Average production per cow	15,000
Death loss	
Calves	5.00%
Cows	5.00%
Turnover rate	25.00%

All calves sold (may be to another enterprise such as heifer raising)

Number of cows in herd is stable

Alaska Dairy Budget for 2004

18000 pounds of milk per cow

Receipts	Unit(s)	Price or Cost/ unit	Number of Units/cow	Value or Cost per cow	Value per cwt	Total Value
Milk Sales	Cwt	$20.95	18,000	$3,771.00	$20.95	$377,100
Sale of calves						
Bulls	Head	$0.00	0.44	$0.00	$0.00	$0
Heifers	Head	$100.00	0.44	$44.00	$0.24	$4,400
Sale of cull cows	Head	$600.00	0.20	$120.00	$0.67	$12,000
Other (manure ,etc)	Head	$0.00	1.00	$0.00	$0.00	$0
Subtotal				$3,935.00	$21.86	$393,500
Expenses						
Operating						
Feed				$2,108.45	$11.71	$210,845
Grass hay	Ton	$225.00	4.18	$940.50	$5.23	$94,050
Pasture	AUMs	$15.00	0.00	$0.00	$0.00	$0
Silage/haylage	Ton	$75.00	0.00	$0.00	$0.00	$0
Barley	Ton	$165.00	1.82	$300.30	$1.67	$30,030
Concentrates	Ton	$259.00	3.35	$867.65	$4.82	$86,765
Trucking	Head	$0.00	1.00	$0.00	$0.00	$0
Bedding	Head	$25.00	1.00	$25.00	$0.14	$2,500
Supplies	Head	$60.00	1.00	$60.00	$0.33	$6,000
DHIA	Head	$0.00	1.00	$0.00	$0.00	$0
Utilities	Head	$125.00	1.00	$125.00	$0.69	$12,500
Vet & Medicine	Head	$50.00	1.00	$50.00	$0.28	$5,000
Custom/trim	Head	$10.00	1.00	$10.00	$0.06	$1,000
Breeding	Head	$18.00	1.60	$28.80	$0.16	$2,880
Operating interest	Head	$10.00	1.00	$10.00	$0.06	$1,000
Replacements	Head	$1,500.00	0.25	$375.00	$2.08	$37,500
Subtotal				$2,792.25	$15.51	$279,225
Allocated						
Repairs & maintenance						
Barn & facilities	Head	$42.00	1.00	$42.00	$0.23	$4,200
Equipment	Head	$25.00	1.00	$25.00	$0.14	$2,500
Depreciation						
Barn & facilities	Head	$1.00	1.00	$1.00	$0.01	$100
Equipment	Head	$2.00	1.00	$2.00	$0.01	$200
Interest						
Barn & facilities	Head	$20.00	1.00	$20.00	$0.11	$2,000
Livestock	Head	$12.00	1.00	$12.00	$0.07	$1,200
Fuel & oil	Head	$35.00	1.00	$35.00	$0.19	$3,500
Insurance	Head	$12.00	1.00	$12.00	$0.07	$1,200
Hired labor	Head	$250.00	1.00	$250.00	$1.39	$25,000
Misc.	Head	$13.00	1.00	$13.00	$0.07	$1,300
Property taxes	Head	$1.00	1.00	$1.00	$0.01	$100
Subtotal				$413.00	$2.29	$41,300
Total costs				$3,205.25	$17.81	$320,525
Net returns						
Above feed costs				$1,826.55	$10.15	$182,655
Above operating				$1,142.75	$6.35	$114,275
Above total costs (amount for family living and debt payments)				$729.75	$4.05	$72,975

Assumptions

Average number of cows in herd	100
Average production per cow	18,000
Death loss	
Calves	5.00%
Cows	5.00%
Turnover rate	25.00%

All calves sold (may be to another enterprise such as heifer raising)

Number of cows in herd is stable

Alaska Dairy Budget for 2004

21000 pounds of milk per cow

Receipts	Unit(s)	Price or Cost/ unit	Number of Units/cow	Value or Cost per cow	Value per cwt	Total Value
Milk Sales	Cwt	$20.95	21,000	$4,399.50	$20.95	$439,950
Sale of calves						
Bulls	Head	$0.00	0.44	$0.00	$0.00	$0
Heifers	Head	$100.00	0.44	$44.00	$0.21	$4,400
Sale of cull cows	Head	$600.00	0.20	$120.00	$0.57	$12,000
Other (manure ,etc)	Head	$0.00	1.00	$0.00	$0.00	$0
Subtotal				$4,563.50	$21.73	$456,350
Expenses						
Operating						
Feed				$2,263.56	$10.78	$226,356
Grass hay	Ton	$225.00	4.22	$949.50	$4.52	$94,950
Pasture	AUMs	$15.00	0.00	$0.00	$0.00	$0
Silage/haylage	Ton	$75.00	0.00	$0.00	$0.00	$0
Barley	Ton	$165.00	1.82	$300.30	$1.43	$30,030
Concentrates	Ton	$256.00	3.96	$1,013.76	$4.83	$101,376
Trucking	Head	$0.00	1.00	$0.00	$0.00	$0
Bedding	Head	$25.00	1.00	$25.00	$0.12	$2,500
Supplies	Head	$60.00	1.00	$60.00	$0.29	$6,000
DHIA	Head	$0.00	1.00	$0.00	$0.00	$0
Utilities	Head	$125.00	1.00	$125.00	$0.60	$12,500
Vet & Medicine	Head	$50.00	1.00	$50.00	$0.24	$5,000
Custom/trim	Head	$10.00	1.00	$10.00	$0.05	$1,000
Breeding	Head	$18.00	1.60	$28.80	$0.14	$2,880
Operating interest	Head	$10.00	1.00	$10.00	$0.05	$1,000
Replacements	Head	$1,500.00	0.25	$375.00	$1.79	$37,500
Subtotal				$2,947.36	$14.04	$294,736
Allocated						
Repairs & maintenance						
Barn & facilities	Head	$42.00	1.00	$42.00	$0.20	$4,200
Equipment	Head	$25.00	1.00	$25.00	$0.12	$2,500
Depreciation						
Barn & facilities	Head	$1.00	1.00	$1.00	$0.00	$100
Equipment	Head	$2.00	1.00	$2.00	$0.01	$200
Interest						
Barn & facilities	Head	$20.00	1.00	$20.00	$0.10	$2,000
Livestock	Head	$12.00	1.00	$12.00	$0.06	$1,200
Fuel & oil	Head	$35.00	1.00	$35.00	$0.17	$3,500
Insurance	Head	$12.00	1.00	$12.00	$0.06	$1,200
Hired labor	Head	$250.00	1.00	$250.00	$1.19	$25,000
Misc.	Head	$13.00	1.00	$13.00	$0.06	$1,300
Property taxes	Head	$1.00	1.00	$1.00	$0.00	$100
Subtotal				$413.00	$1.97	$41,300
Total costs				$3,360.36	$16.00	$336,036
Net returns						
Above feed costs				$2,299.94	$10.95	$229,994.00
Above operating				$1,616.14	$7.70	$161,614
Above total costs (amount for family living and debt payments)				$1,203.14	$5.73	$120,314

Assumptions

Average number of cows in herd	100
Average production per cow	21,000
Death loss	
Calves	5.00%
Cows	5.00%
Turnover rate	25.00%

All calves sold (may be to another enterprise such as heifer raising)

Number of cows in herd is stable

Introduction

In the spring of 2004 Anthony (Tony) Nakazawa, Director of Extension Services in Alaska, sent an e-mail message to the Extension Directors in each of the western states requesting information concerning anyone who was doing work on the economics of the dairy industry in their state. While dairy production in the western United States is the area where most of the growth in the dairy industry has occurred in the last 10 years, there are only five individuals in the states west of the Mississippi who do work concerning the economics of milk production on a regular basis. These include Wilson Gray (Idaho), Robert B "Bud" Schwart (Texas A&M who recently retired), Russell Tronstad (Arizona), Leslie "Bees" Butler (UC Davis), and myself (Utah State). All of these individuals also work on nondairy issues. Contact was made by personnel at Utah State University with Director Nakazawa, and a study was proposed that would evaluate the economics of the dairy industry in Alaska because no one with expertise in the area of dairy economics existed in Alaska. A full analysis of the industry would require a very significant effort because the issues associated with the production, processing, and distribution of milk/milk products in Alaska would need to be considered. As a result, it was decided that a study be conducted of the problems and issues that affect the farm-level costs and returns of producing milk in Alaska as an initial step in the possible evaluation of the dairy industry in the state.

Procedures

The first step taken in this study was an initial visit to Alaska. This occurred in late August. Milan Shipka (University of Alaska-Fairbanks, UAF), and I briefly visited several farms

in the Matanuska Valley area, including dairies operated by Wayne Brost and Bob Havemeister. I attended a Farm Bureau-sponsored conference concerning the possible opening of the borders with Canada. I also visited with colleagues at USU, who had been on the faculty at UAF for several years, as well as numerous discussions with Milan Shipka, an extension animal scientist at UAF.

A questionnaire was sent to each of the nine families who operate dairies in Alaska soliciting production and financial information (see Appendix 1). Each of these producers was also personally contacted by Bill Hall (UAF Extension) and encouraged to participate in the study (every producer but one provided at least some of the data requested). Milk shipment data for each producer who shipped milk to the processing plant (Mat Maid) in Anchorage were obtained from the creamery (including data for the one producer who did provide survey data). Milk production data for most producers in the Delta Junction area were provided by those operators. Basic loan information (amount of debt, payments details, etc.) was obtained from the primary lenders who provided loans to dairy operations in Alaska. The information provided as well as published information were the primary sources of information used in this study. While this information was invaluable, there is no substitute for "on the ground" experience and knowledge. But intimate knowledge of local conditions also has the tendency to limit a person's perspective of broader issues that may result in a degree of myopic vision. This report is designed to provide a broader view of the dairy industry in the United States and provide insights that can be used in evaluating the future of the dairy industry in Alaska.

Insights Concerning the "The Alaska Factor"

My initial visit to Alaska resulted in a major surprise. Vegetation in the Matanuska Valley reminded me of dairies in Oregon. It was significantly more temperate than I expected. I also visited with a family who operated a dairy in Cache Valley (northern Utah) and had moved to Alaska about 10 years ago. He indicated that it was no colder in the Anchorage area than it was in Cache Valley. This caused me to look at some weather records.

Weather

To provide me with insights into what differences might exist between weather conditions in Alaska and in areas that were either familiar to me or were areas where cost-of-production studies for dairies were readily available, seven locations were chosen. These included Palmer and Delta Junction, Alaska; Logan (Cache Valley), Utah; Afton (Star Valley), Wyoming; Bozeman, Montana; Fargo, North Dakota; Tillamook, Oregon; Jerome, Idaho; and Bellingham, Washington. Tables 1–4 provide a synopsis of weather records for these sites.

As expected, the temperatures (averages as well as record highs and lows) in the winter are significantly lower for Delta Junction, Alaska than any of the other sites. Summer temperatures, however, are similar to some of the other locations. This suggests that agricultural enterprises would have significant limitations in the winter but not in the summer.

Winter temperatures for Palmer, Alaska are comparable to those in Afton, Wyoming, and Bozeman, Montana and are generally slightly warmer than the temperatures in Fargo, North Dakota but slightly colder than those in Cache Valley. These data suggest that temperatures

Table 1. Average high temperature by month for selected sites

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Palmer AK	22	27	35	46	58	65	67	65	56	41	28	24
Delta Junction AK	4	11	25	43	58	67	70	65	53	31	14	7
Logan UT	31	37	49	59	68	79	88	87	76	63	45	33
Twin Falls ID	37	43	52	61	70	79	88	87	77	65	48	38
Fargo ND	16	23	35	55	70	77	82	81	70	56	35	21
Afton WY	27	33	40	50	61	72	80	79	69	58	39	28
Bozeman MT	33	39	46	56	64	74	82	82	71	59	42	34
Tillamook OR	50	53	54	57	60	64	67	68	69	62	54	50
Jerome ID	36	42	52	62	71	81	90	90	78	65	48	37
Bellingham WA	46	49	53	58	63	68	73	73	67	59	52	47

Table 2. Average low temperature by month for selected sites

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Palmer AK	6	10	17	28	38	46	49	47	40	26	13	9
Delta Junction AK	-10	-6	3	22	38	48	51	46	36	17	-1	-7
Logan UT	13	17	26	34	42	49	55	53	44	34	24	14
Twin Falls ID	20	23	29	35	43	51	56	54	45	36	27	20
Fargo ND	-2	6	19	32	45	55	59	57	46	34	19	4
Afton WY	2	6	15	24	32	38	43	42	33	23	14	3
Bozeman MT	14	18	24	31	39	46	52	51	42	33	22	15
Tillamook OR	36	37	37	39	43	47	50	50	47	42	39	36
Jerome ID	18	22	28	33	41	49	55	53	45	35	26	19
Bellingham WA	35	36	39	42	47	51	54	55	50	45	40	35

Table 3. Record high temperature by month for selected sites

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Palmer AK	52	54	56	67	77	87	84	82	73	66	59	54
Delta Junction AK	48	51	58	72	90	92	91	90	79	66	52	55
Logan UT	60	67	74	84	92	99	104	102	99	86	71	67
Fargo ND	53	66	78	100	98	100	106	106	102	93	74	57
Afton WY	54	56	68	78	85	94	95	95	93	83	70	58
Bozeman MT	65	63	73	83	91	96	105	99	95	88	73	63
Tillamook OR	69	73	73	84	87	92	102	102	97	92	80	69
Jerome ID	61	69	79	90	98	105	108	106	102	94	78	65

Table 4. Record low temperature by month for selected sites

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Palmer AK	-37	-32	-25	-8	15	33	36	26	15	-8	-26	-38
Delta Junction AK	-63	-60	-49	-37	-1	30	32	22	-11	-39	-47	-62
Logan UT	-25	-29	-12	10	20	29	39	34	22	6	-10	-30
Fargo ND	-36	-39	-34	-7	17	11	36	33	19	5	-24	-32
Afton WY	-46	-40	-22	-3	9	19	26	21	11	-2	-22	-38
Bozeman MT	-36	-43	-27	-10	16	26	32	26	12	-10	-26	-36
Tillamook OR	1	5	18	23	25	31	34	33	27	22	14	4
Jerome ID	-22	-16	-1	15	19	28	37	35	21	12	-10	-24

during the winter in the Matanuska Valley are not significantly different than they are in some of the dairy production areas in the intermountain west or upper great plains. These data do indicate that the temperatures are cooler during the summer months in the Palmer area than most of the other areas selected. This would suggest that cows in the Matanuska Valley would likely not be stressed during the winter any more than they would in other areas and would not experience stress from heat during the summer to the degree they are in some of the areas selected.

The precipitation data in Table 5 also suggest a weather pattern that is similar to some of the areas in the intermountain area. This, combined with the temperature data in Tables 1–4, suggest that snow fall is likely to be greater in Cache Valley, Star Valley, and Bozeman than it is in the Matanuska Valley. But rainfall is higher in the summer months in the Alaska than most of the areas selected in the intermountain area.

Daylight

While temperature and rainfall data in the Matanuska Valley do not appear to be significantly different from areas in the "lower 48" that produce milk, there is one significant difference—the hours of daylight in the winter and summer periods are very different. It is

Table 5. Average precipitation by month for selected locations

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Palmer AK	0.84	0.84	0.72	0.44	0.66	1.31	2.06	2.29	2.59	1.74	1.09	1.22
Delta Junction AK	0.34	0.41	0.22	0.2	0.77	2.38	2.77	2.11	1.03	0.73	0.59	0.39
Logan UT	1.34	1.42	1.86	1.98	2.11	1.26	0.89	0.93	1.55	1.78	1.38	1.36
Twin Falls ID	1.07	0.75	1.03	0.83	1.04	0.77	0.22	0.33	0.45	0.75	1.12	1.06
Fargo ND	0.76	0.59	1.17	1.37	2.61	3.51	2.88	2.52	2.18	1.97	1.06	0.57
Afton WY	1.51	1.19	1.44	1.65	2.19	1.49	1.42	1.26	1.61	1.49	1.46	1.43
Bozeman MT	0.84	0.7	1.4	2.06	3.22	2.85	1.44	1.48	1.8	1.61	1.1	0.79
Tillamook OR	13.9	10.79	9.9	6.81	4.84	3.41	1.64	1.42	3.68	7.16	13.72	13.94
Jerome ID	1.4	1.07	1.28	0.86	1.14	0.76	0.22	0.27	0.49	0.77	1.29	1.23

known that the lack of light has a significant impact on milk production and reproduction. These disadvantages can be overcome with "proper" lighting.[1] The long daylight hours in the summer, however, should be an advantage to Alaskan producers, but it may not override the disadvantages associated with the period of darkness that exists in the winter.

Growing Degree Days

One of the most common measures that combines temperature and daylight is growing degree days (GDD). It is basically an index of the amount of heat that is available for plant growth. It is generally measured by adding the maximum and minimum temperatures for a day and dividing this sum by two. This average temperature is then subtracted from some base value, such as 40 or 50 degrees. Any value that is negative is given a value of zero. The GDD for each day are then summed for a growing season. This measure is used heavily in the midwestern United States (a 50-degree base is used), because no appreciable growth in corn occurs when the temperature is less than 50 degrees. The GDD for the seven locations noted earlier is shown in

[1]Neither of the dairies I visited in the summer of 2004 appeared to be equipped to provide the artificial light suggested by research.